Claims

1. An apparatus comprising:

a titanium (Ti) layer including at least ninety atomic percent titanium (Ti);

a titanium-nitride (TiN) layer that is attached to the titanium layer, the titanium-nitride (TiN) layer having a thickness that is less than that of the titanium (Ti) layer, the titanium-nitride (TiN) layer including at least forty atomic percent titanium (Ti) and at least forty atomic percent nitrogen (N); and

a porcelain layer that is bonded to the titanium-nitride (TiN) layer, the porcelain layer having a thickness that is greater than thickness of the titanium (TiN) layer.

2. The apparatus of claim 1, wherein the porcelain layer has an outer surface with a shape that substantially matches that of a tooth.

3. The apparatus of claim 1, wherein the porcelain layer is part of a crown for a tooth.

4. The apparatus of claim 1, wherein the porcelain layer is part of a veneer for a tooth.

5. The apparatus of claim 1, wherein the titanium (Ti) layer has a substantially concave surface and a substantially convex surface, and the titanium-nitride (TiN) layer is attached to the substantially convex surface.

6. The apparatus of claim 1, wherein the titanium-nitride (TiN) layer has a thickness that is less than one-half millimeter, and the titanium (Ti) layer has a thickness that is less than three millimeters.

7. The apparatus of claim 1, wherein the titanium (Ti) layer has a plurality of pockets disposed on a surface that is distal to the titanium-nitride (TiN) layer.

8. The apparatus of claim 1, wherein the titanium (Ti) layer has a tapered end.

9. The apparatus of claim 1, wherein the titanium (Ti) layer is formed by cathodic arc deposition.

10. The apparatus of claim 1, wherein titanium (Ti) layer and the titanium-nitride (TiN) layer have a combined thickness that is less than 0.2 millimeters.

11. A method comprising:

forming a titanium (Ti) vapor that solidifies to form a titanium (Ti) layer;

forming a titanium-nitride (TiN) vapor that coats the titanium (Ti) layer with a titanium-nitride (TiN) layer; and

forming a porcelain layer on the titanium-nitride (TiN) layer.

12. The method of claim 11, further comprising providing a mold of a tooth, over which the titanium (Ti) layer is formed.

13. The method of claim 11, further comprising forming a titanium-nitride (TiN) underlayer, on which the titanium (Ti) layer is formed.

14. The method of claim 11, further comprising forming a titanium-oxide (TiO) underlayer, on which the titanium (Ti) layer is formed.

15. The method of claim 11, further comprising positioning a device adjacent to the titanium (Ti) layer to partially block the titanium (Ti) vapor.

16. The method of claim 11, wherein forming a titanium (Ti) vapor includes ionizing a titanium (Ti) target.

17. The method of claim 11, further comprising forming titanium (Ti) macroparticles along with the titanium (Ti) vapor, wherein the titanium (Ti) layer has a greater volume formed from the titanium (Ti) vapor than from the titanium (Ti) macroparticles.

18. The method of claim 11, further comprising:

forming a mandrel over which the titanium (Ti) layer is formed; and

removing the mandrel after the porcelain layer has been formed on the titanium-nitride (TiN) layer.

19. The method of claim 11, wherein the titanium (Ti) layer, the titanium-nitride (TiN) layer and the porcelain layer form a dental device, and further comprising attaching the dental device to a tooth portion.

20. A biomedical device comprising:

a layer of titanium (Ti) having a thickness that is less than two millimeters, the titanium (Ti) layer having a concave surface and a convex surface; and

a layer of titanium-nitride (TiN) that is bonded to the convex surface of the titanium (Ti) layer, the titanium-nitride (TiN) layer having a thickness that is less than the thickness of the titanium (Ti) layer;

wherein the device fits within a mammal and is biocompatible with the mammal.

21. The device of claim 20, further comprising a porcelain layer that is bonded to the titanium-nitride (TiN) layer.

22. The device of claim 21, wherein the porcelain layer has an outer surface shaped to match that of a tooth.

23. The device of claim 20, further comprising a second titanium-nitride (TiN) layer that is bonded to the concave surface of the titanium (Ti) layer.

24. The device of claim 20, further comprising a titanium-oxide (TiO) layer that is bonded to the concave surface of the titanium (Ti) layer.

25. The device of claim 20, wherein the titanium (Ti) layer is formed by cathodic arc deposition.

26. The device of claim 20, wherein the titanium-nitride (TiN) layer is formed by cathodic arc deposition.